

CONSISTENT HIT

DETAILED DESIGN REVIEW

Jay Anderson, Jason Borth, Dillon Glover, Kylie Touchstone



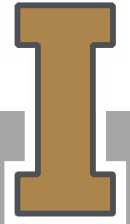
BACKGROUND:

- Currently every riflescope is impacted tested as it goes through the production line.
- This is done manually by impacting it against a padded pedestal.
- After each impact the riflescope is checked to insure nothing internally has shifted.



DESIGN GOAL

Design and build a proof of concept, impact testing device than can consistently deliver a calibrated impact at required orientations to a riflescope.



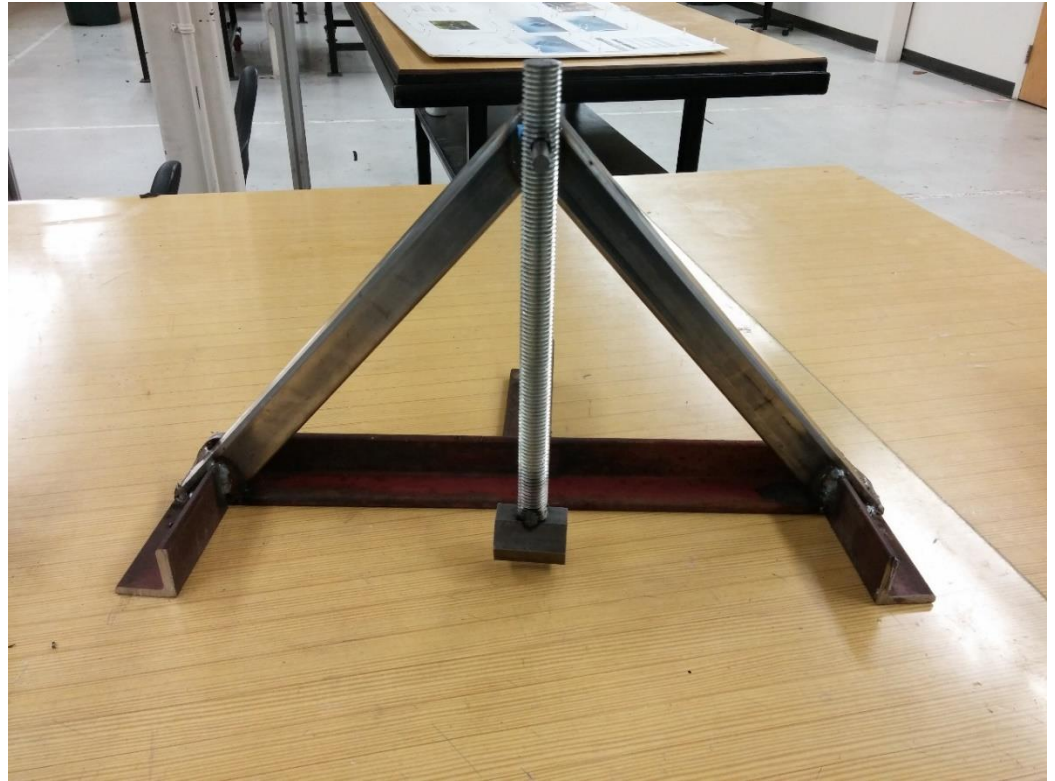
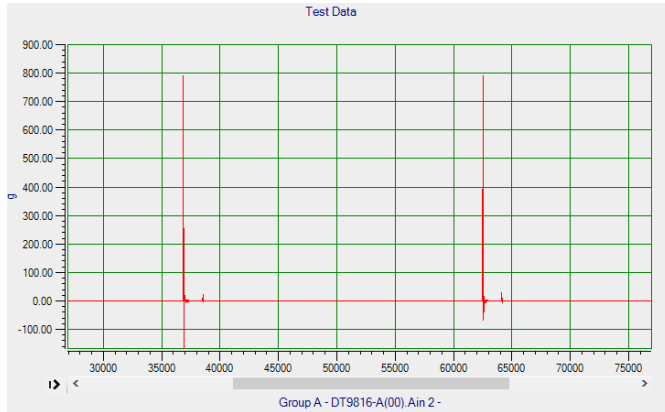
DESIGN SPECS

Specification	Threshold	Objective
Force applied to scope	500g-1600g	200-2000g
Impact Region	All four sides and forward impact	360 capability
Impact Mode	Single	Single and Cyclic (3)
Machine Use	Research and development. Proof Concept	Production floor ready
Size of Machine	2'x2'x3'	1'x1'x2'
Different Sizes of Scopes	Attachment methods for 30mm and 34mm diameters tubes.	Single, adjustable attachment method.



1ST PROTOTYPE

- Initial design to test the pendulum idea
- Testing was done from 90°
- Results were constantly around 700-800 Gs

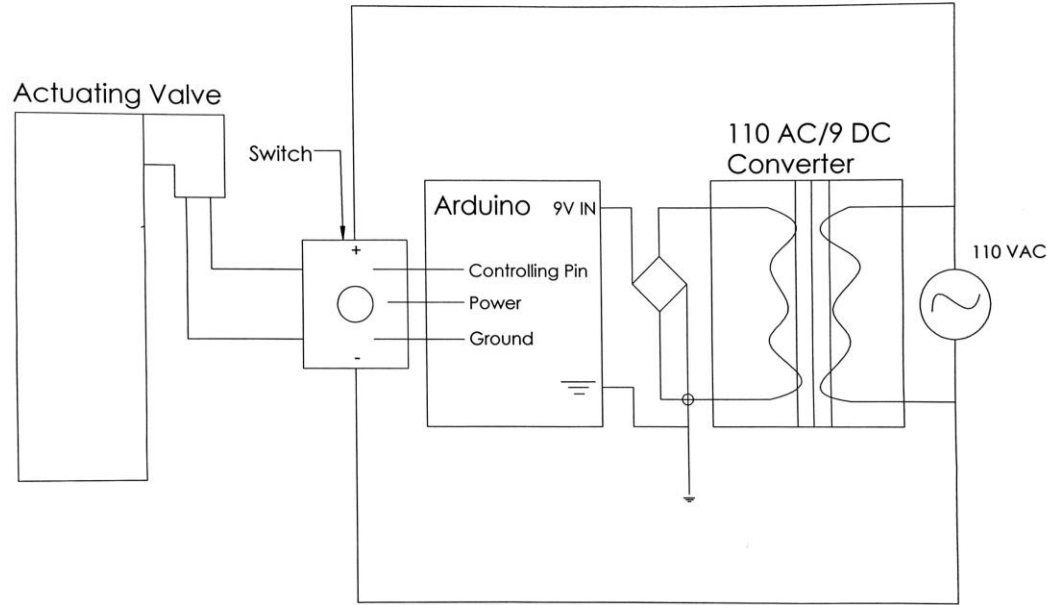


2ND PROTOTYPE

- Stress-free to use
- Easy to alter
- Lots of options (attachments)
- Little machining needed
- Ease of purchasing
- Adjustable pendulum head
- Easy to replace parts



PNEUMATICS SCHEMATICS

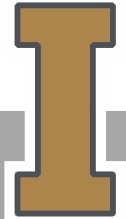


Wiring Schematic



BUDGET (SPENT)

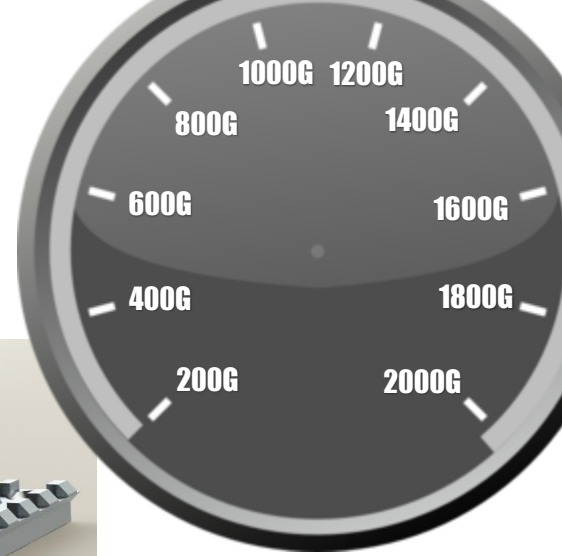
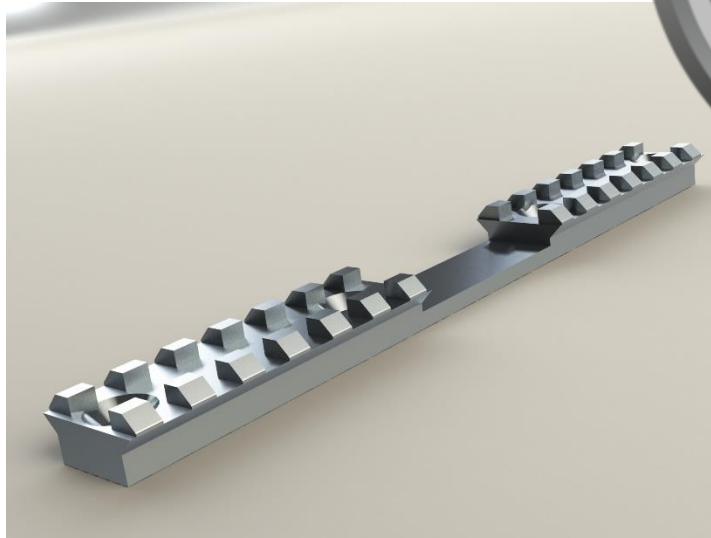
Material Budget
\$4400
Total Spent
\$896.78
Total Remaining
\$3503.22



Material Expenditures			
Item	Quantity	Price	Total
Compact Rotary Air Actuator, 20 in lbs Torque at 70 PSI	1	139.18	139.18
Push-to-Connect Tube Fitting for Air, Straight Adapter for 1/4" Tube OD X 10-32 UNF Male	4	3.52	14.08
Push-to-Connect Tube Fitting for Air, Straight Adapter for 1/4" Tube OD X 1/4 NPT Male	1	3.08	3.08
Flange Style Bracket for 1.97" OD, Compact Rotary Air Actuator	1	10.82	10.82
High-Strength Multipurpose Neoprene Rubber, Adhesive-Back, 3/32" Thickness, 12" X 12", 50A Durometer	1	20.89	20.89
10' ft Aluminum T-Slot	5	31.59	157.95
90° Plates	20	8.47	169.4
Clear Anodized Aluminum Tees	18	8.83	158.94
Compact Zinc Plate	5	1.85	9.25
Thick Sheets - Unpolished 4"x48"	1	31.24	31.24
Pressure Regulator, Water Separator, pressure gauge	1	32.24	32.24
Tubing (1/4 OD)	1	13	13
Clippard Valve	1	34.94	34.94
Fitting 1/4 NPT to 1/4 OD Tube	4	3.08	12.32
Fitting 1/8 NPT to 1/4 OD Tube	4	3.08	12.32
Low-Carbon Steel Bar, 1" Square, 1/2' Length	1	8.46	8.46
Hardened Precision Steel Shaft 3/4" Diameter, 24" Length	1	22.74	22.74
Low-Carbon Steel Tubing, 1.125: OD, .75" ID, .188" Wall Thickness, 3' Length	1	29.35	29.35
Low-Carbon Steel Sheet, 1/8" Thick, 3"x3", Ground Finish	2	8.29	16.58

FUTURE PLANS

- Pneumatics hooked up and able to apply a cyclic impact mode.
- Scope mounting.
- Calibration of pneumatics
- Variety in impact forces.
- Front impact.



ADDITIONAL IMPROVEMENTS

- Fast Mounting
- Safety features
 - Safety glass
 - Instructions laser engraved on safety glass
- Smaller Size
- Quieter



FUTURE BUDGET (ESTIMATE)

Remaining Budget
\$3503.22
Future Budget Estimate
197.51
Estimated Remaining budget
3305.71

Material Expenditures			
Item	Quantity	Price	Total
Polycarbonate 12"x24"	3	15.09	45.27
Polycarbonate 24"x24"	2	26.98	53.96
Polycarbonate 24"x24"	2	39.14	78.28
Arduino	1	20.00	20.00
			Total = 197.51



QUESTIONS?

